Information Technology Interoperability Standardization and Quality for Justice/Public Safety/Homeland Security

Outputs

- XML Data Model and Data Dictionary.
- Acoustic coupling facility for public safety audio quality testing.

ITS is conducting a technical program aimed at facilitating effective interoperability and information sharing among dissimilar information systems within the justice/public safety/homeland security community, and ensuring that there are standardized procedures to measure the quality of speech delivered through public safety's communications systems.

The primary focal points of the IT interoperability portion of the program are: (1) the identification and delineation of applicable information sharing architectures, (2) coordination between major Federal players and local, state, and tribal public safety practitioners to collegially develop a nationwide strategic plan for information sharing, and (3) the identification and/or development of standards that address the community's requirements and are in conjunction with the strategic plan. All efforts are aimed at allowing local, state, tribal, and Federal agencies to exchange information, without requiring substantial changes to internal systems or procedures.

The primary focal point of the audio quality portion of the program is to provide a facility that can emulate, in a controlled laboratory environment, the field conditions experienced by public safety practitioners.

The ITS program is sponsored by a number of different Federal departments and programs that have a keen interest in public safety interoperability, including: National Institute of Standards and Technology (NIST) Office of Law Enforcement Standards (OLES), National Institute of Justice (NIJ) CommTech Program (formerly AGILE Program), Department of Justice Office of Community Oriented Policing Services (COPS), National Communications System (NCS), Department of Homeland Security's Public Safety Wireless Communications (SAFECOM) Program, Department of Homeland Security Chief Information Officer's Wireless Management Office (WMO), and NTIA.

XML Data Model and Data Element Dictionary Development

In prior years, ITS played a significant role in providing technical assistance and coordination in the initial development of an Extensible Markup Language (XML) Data Element Dictionary that can provide common "words" for a common "language" to be used by the justice/public safety/homeland security community. In 2003, the XML development work skyrocketed, with an order of magnitude increase in the size of the data element dictionary and 2004 saw the public release of the enlarged dictionary along with an associated data model.

The development of the Global Justice XML Data Model (GJXDM) is a significant step forward in achieving information sharing interoperability among members of the justice and public safety community. It provides a foundation for the structure of a consistent data element dictionary, documents to be exchanged, and messages to be passed. The core of the data model is the XML Data Dictionary and the corresponding "Justice" namespace. Users and developers use the "words" of the Data Dictionary to build documents that represent a particular information exchange. Based on their requirements, they can import the words by reference and can extend or restrict the definitions.

The significantly-expanded data dictionary contains over 2000 elements and is expected to meet over 90% of the information sharing requirements of the justice/public safety/homeland security community. The GJXDM was initially released in February 2004 and the current released version of the dictionary is available to the public at http://it.ojp.gov/gjxdm/ .

Audio Quality Testing for Public Safety

There are several reasons for developing high-quality acoustic coupling capabilities which are not common in telecommunications laboratories to provide speech stimulus to public safety communications devices. One reason is that the electrical interfaces are non-standard and highly specific to each manufacturer and/or device model. Another is that acoustic coupling provides a means to perform calibrated laboratory emulation of the acoustic environment experienced in the field.

Head and torso simulator with public safety headset and microphone installed (photograph by D.J. Atkinson).

One of the most significant challenges that public safety practitioners face in communicating effectively is the severe nature of the environment in which they must operate. Speech quality is directly impacted by a variety of surrounding conditions that produce high noise levels, even before operationally required tools, such as sirens, are employed. These make for very challenging communication scenarios.

The Institute's acoustic coupling facility provides emulation of practitioners within these scenarios through the use of an international standard Head and Torso Simulator (HATS). The HATS provides calibrated speakers that represent an artificial mouth, and calibrated microphones that represent artificial ears. A handset positioning system allows public safety communications equipment to be positioned as it would be used in real life. The figure shows the HATS with a headset and noise canceling microphone installed.

Once the communications equipment is properly positioned, the HATS is placed into the sound-attenuated chamber where high-quality digital recordings of operating public safety equipment are played through a surround-sound system. The acoustic environment from a particular public safety event is then introduced (e.g., police car in pursuit, fire truck in route; helicopter in the air, boat involved in high-speed chase).

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